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10/759,344

01/15/2004

Sang Hun Lee

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EXAMINER

SMYTH, ANDREW P

ART UNIT

PAPER NUMBER

2881

MAIL DATE

DELIVERY MODE

11/23/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/759,344

Applicant(s)

LEE ET AL.

Examiner

Andrew Smyth

Art Unit

2881

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 07 September 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☐ Claim(s) \_\_\_\_\_ is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-26 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 September 2007 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>03/17/2004</u> .  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Information Disclosure Statement***

1. The information disclosure statement considered by the examiner.

### ***Response to Amendment***

1. The objected to claims have been corrected.

### ***Response to Arguments***

1. Applicant's arguments filed 09/07/2007 have been fully considered but they are not persuasive.

Regarding original claims 1, 10, 13, and 24 rejections; Banine (US 20050140945) teaches: a magnetic field generator operative to generate a magnetic field around the one or more collector optics, as shown (figure 6, MC1, MC2, COL). MC1 and MC2 generate a magnetic field (B) depicted by curved arrow that travels in direction from MC2 towards MC1 and encompasses Col, the collector optic; see also [0072].

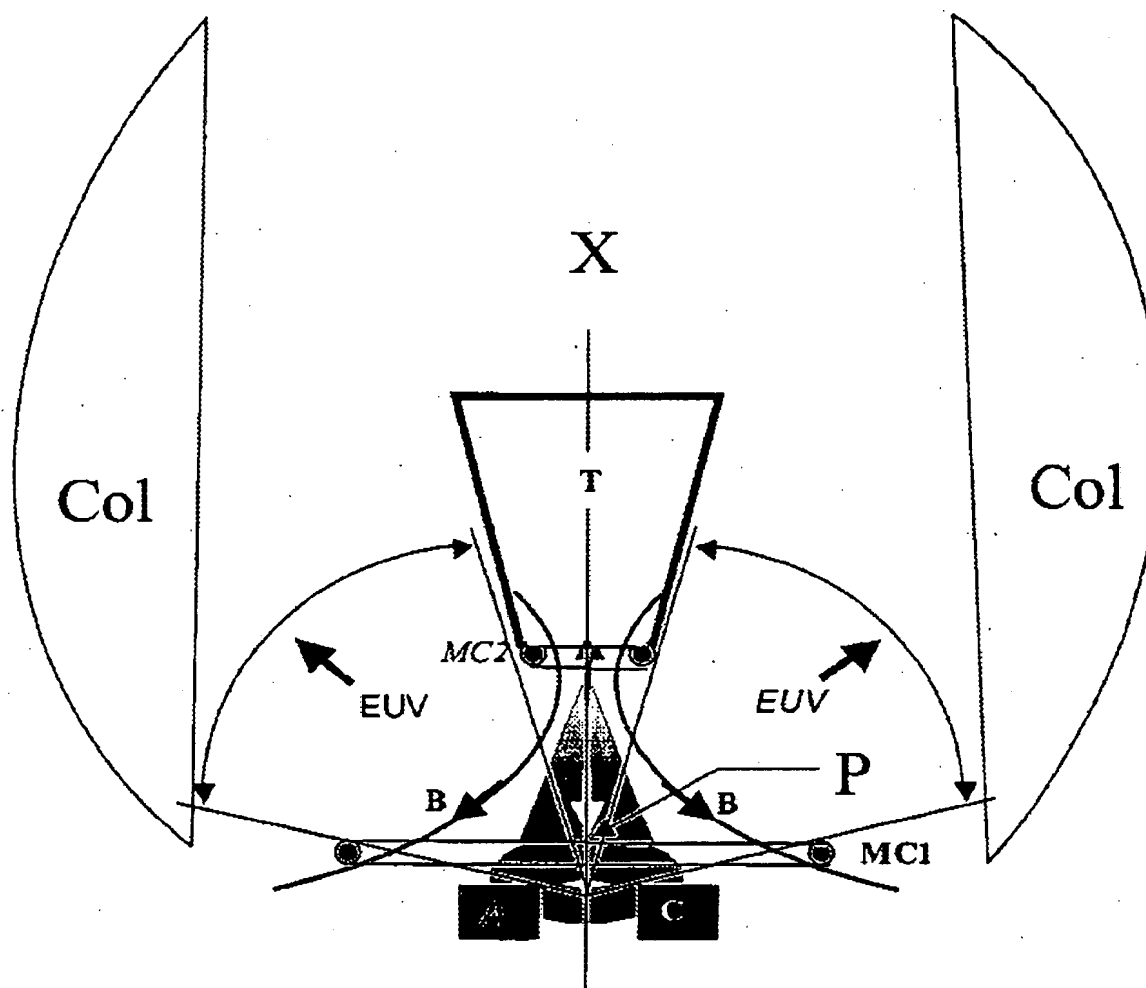


Fig.6

Regarding original claim 24 rejection; Barine (US 20050140945) also teaches: a solenoid structure to generate a magnetic field to mitigate debris [0019].

All previous claim rejections, with regard to original and "amended" claims, still stand, see below.

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

2. Claims 1-3, 8-16, and 22-26 are rejected under 35 U.S.C. 102(e) as being anticipated by Banine et al. (US PGPub 2005/0140945).

Regarding applicant's claim 1, Banine discloses: an apparatus comprising: a plasma produced light source[0005]; one or more collector optics[0056]; and a magnetic field generator operative to generate a magnetic field [0064] around the one or more collector optics (figure 8c, MHD barrier, optics), the magnetic field generator (figure 6, MC1, MC2) comprising windings [0016] around a non-reflective surface in the one or more collector optics (figure 6, Col).

Regarding applicant's claim 2, Banine discloses: the windings comprise at least one of a wire [0016], a bump, and an electret fiber.

Regarding applicant's claim 3, Banine discloses: introducing a potential difference between the windings and the non-reflective surface (figures 4c, 4d, and 4e; see also [0069]).

Regarding applicant's claim 10, Banine discloses: an apparatus comprising: a plasma produced light source[0005]; one or more collector optics[0056]; and a magnetic field generator operative to generate a magnetic field [0064] around the one or more collector optics (figure 8c, MHD barrier, optics), the magnetic field generator (figure 6, MC1, MC2) comprising a solenoid structure [0019] adjacent a non-reflective surface in the one or more collector optics (figure 6, MC1, MC2, Col).

8. The apparatus of claim 1, further comprising:

Regarding applicant's claims 8 and 12, Banine discloses: a plurality of foil traps [0065], [0072], (figure 6, T), and (figure 2, S) between the source and the collector optics (figure 6, A,C, Col).

Regarding applicant's claim 13, Banine discloses: a method [0029] comprising: generating a magnetic field around collector optics in a lithography system [0032] with windings [0072] around a non-reflective surface in the collector optics (figure 6, MC1, MC2, Col); and deflecting debris particles generated by a plasma producing light source [0072] and (figure 6) from a reflective surface in the collector optics.

Regarding applicant's claim 14, Banine discloses: deflecting the debris particles toward a non-reflective surface in the collector optics (figure 6, MC1, MC2, Col); see

also (figure 2, P-, B, S; where: S is a non-reflective surface, and P- a negative charged particle, and B the magnetic field).

Regarding applicant's claim 15, Banine discloses: the windings comprise at least one of a wire [0016], a bump, and an electret fiber.

Regarding applicant's claim 16, Banine discloses: introducing a potential difference between the windings and the non-reflective surface (figures 4c, 4d, and 4e; see also [0069]).

Regarding applicant's claim 24, Banine discloses: a method [0029] comprising: generating a magnetic field around collector optics in a lithography system [0032] with a solenoid (figure 6, MC1, MC2) structure adjacent a non-reflective surface in the collector optics (figure 6, MC1, MC2, Col); and deflecting debris particles generated by a plasma producing light source [0072] and (figure 6) from a reflective surface in the collector optics.

Regarding applicant's claims 22 and 25, Banine discloses: capturing debris particles with foil traps [0065], [0072], (figure 6, T), and (figure 2, S) between the source and the collector optics (figure 6, A, C, Col).

Regarding applicant's claims 9, 11, 23, and 26, Banine discloses: the light source comprises an extreme ultraviolet (EUV) light source (figure 6, EUV; see also [0072]).

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 4-7 and 17-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Banine et al. (US PGPub 2005/0140945) and in light of Melnychuk et al. (US 6,972, 421).

Regarding applicant's claim 4, Banine discloses the elements of claim 1 that applicant's claim 4 depends upon, see above.

However, Banine lacks the collector optics comprise a plurality of nested shells, the shells including reflective surfaces and non-reflective surfaces.

Melnichuk, teaches: the collector optics comprise a plurality of nested shells (figure 9, 4, 5) the shells including reflective surfaces and non-reflective surfaces.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the elements of claim 1 that Banine discloses with the collector optics comprise a plurality of nested shells, the shells including reflective surfaces and non-reflective surfaces, as taught by Melnychuk, to increase the transmission of EUV.

Regarding applicant's claim 5, Banine discloses the elements of claim 4 that applicant's claim 5 depends upon, see above.



However, Banine lacks the magnetic field generator comprises: a current supply connected to one or more of the nested shells and operative to provide a current along a length of said one or more nested shells.

Melnychuk, teaches: the magnetic field generator comprises: a current supply connected to one or more of the nested shells and operative to provide a current along a length of said one or more nested shells (column 25, lines 20-24; see also lines 55-58).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the elements of claim 5, disclosed by Banine, to generate the magnetic field with a current supply, as taught by Melnychuk, to improve control of the magnetic field to improve control of the debris.

Regarding applicant's claim 6, Banine discloses the elements of claim 4 that applicant's claim 6 depends upon, see above.

However, Banine lacks the magnetic field generator comprises: a voltage supply connected between a reflexive side and a non-reflective side of one or more of said nested shells.

Melnychuk, teaches: the magnetic field generator comprises: a voltage supply connected between a reflexive side and a non-reflective side of one or more of said nested shells (column 25, lines 20-24; see also lines 55-58).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the elements of claim 6, disclosed by Banine, to

generate the magnetic field with a voltage supply, as taught by Melnychuk, to improve control of the magnetic field to improve control of the debris.

Regarding applicant's claim 7, Banine discloses the elements of claim 4 that applicant's claim 7 depends upon, see above.

However, Banine lacks the magnetic field generator comprises: a first additional shell around the collector optics; a second additional shell inside the nested shells in the collector optics; and a voltage supply operative to provide a potential difference between the first additional shell and the second additional shell.

Melnichuk (figure 4C), teaches: the magnetic field generator comprises: a first additional shell (OUTER ELECTRODE) around the collector optics (FOCUSING LENS); a second additional shell (INNER ELECTRODE) inside the nested shells in the collector optics; and a voltage supply (HIGH VOLTAGE FROM PULSED POWER) operative to provide a potential difference between the first additional shell and the second additional shell.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the elements of claim 7, disclosed by Banine, with the elements of claim 7, as taught by Melnychuk, to improve control of the magnetic field to improve control of the debris.

Regarding applicant's claim 17, Banine discloses the elements of claim 13 that applicant's claim 17 depends upon, see above.

However, Banine lacks the collector optics comprise a plurality of nested shells, the shells including a reflective surface and a non-reflective surface.

Melnychuk, teaches: the collector optics comprise a plurality of nested shells (figure 9, 4, 5) the shells including reflective surfaces and non-reflective surfaces.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the elements of claim 1 that Banine discloses with the collector optics comprise a plurality of nested shells, the shells including reflective surfaces and non-reflective surfaces, as taught by Melnychuk, to increase the transmission of EUV.

Regarding applicant's claim 18, Banine discloses the elements of claim 13 that claim 17 and thus claim 18 depend upon, see above.

However, Banine lacks deflecting debris particles from a reflective side of one shell to the non-reflective surface of an adjacent shell.

Melnychuk, teaches: deflecting debris particles from a reflective side of one shell to the non-reflective surface of an adjacent shell (figure 9, 5, 4).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the elements of claim 18 that Banine discloses with deflecting debris particles from a reflective side of one shell to the non-reflective surface of an adjacent shell, as taught by Melnychuk, to increase the transmission of EUV and decrease debris on the collector optics.

Regarding applicant's claim 19, Banine discloses the elements of claim 17 that applicant's claim 19 depends upon, see above.

However, Banine lacks generating comprises: providing a current along a length of each of said nested shells.

Melnychuk, teaches: generating comprises: providing a current along a length of each of said nested shells (figure 4C, HIGH VOLTAGE FROM PULSED POWER).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the elements of claim 19, disclosed by Banine, the elements of claim 19, as taught by Melnychuk, to increase the transmission of EUV and decrease debris on the collector optics.

Regarding applicant's claim 20, Banine discloses the elements of claim 17 that applicant's claim 20 depends upon, see above. Banine also discloses introducing a potential difference between the reflective side and the non-reflective side the surface of the shell (figures: 4c, 4d, 4e, and 6).

However, Banine lacks: nested shells.

Melnychuk, teaches: nested shells (figure 9, 5, 4).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the elements of claim 20, disclosed by Banine, with the elements of claim 20, as taught by Melnychuk, to increase the transmission of EUV and decrease debris on the collector optics.

Regarding applicant's claim 21, Banine discloses the elements of claim 17 that applicant's claim 21 depends upon, see above.

However, Banine lacks: introducing a potential difference between a first additional shell around the collector optics and a second additional shell inside the nested shells in the collector optics.

Melnychuk, teaches: introducing a potential difference between a first additional shell around the collector optics and a second additional shell inside the nested shells in the collector optics (figure 4C).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the elements of claim 21, disclosed by Banine, with the elements of claim 21, as taught by Melnychuk, to increase the transmission of EUV and decrease debris on the collector optics.

### ***Conclusion***

2. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

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extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Smyth whose telephone number is 571-270-1746. The examiner can normally be reached on 7:30AM - 5:00PM; Monday thru Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim can be reached on 571-272-2293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

A.S.

  
**ROBERT KIM**  
**SUPERVISORY PATENT EXAMINER**